CLAIMS

1. An engine cranking system comprising:

an engine operably moveable between a running condition and an off condition;

a cranking motor coupled to said engine;

a battery comprising first and second battery terminals, said first battery terminal electrically coupled to said cranking motor and said second battery terminal electrically coupled to a system ground;

a capacitor comprising first and second capacitor terminals;

first and second electrical paths interconnecting said first and second capacitor terminals, respectively, with said cranking motor and said system ground;

first and second switches comprising first and second sets of switch terminals respectively, wherein said first set of switch terminals is coupled between said first battery terminal and said cranking motor; and

a relay included in one of said first and second electrical paths and having a first control terminal and a second control terminal, wherein said second set of switch terminals is coupled between one of said first and second capacitor terminals and said second control terminal, and wherein the other of said first and second capacitor terminals is electrically coupled with said first control terminal, and wherein said relay is moveable between at least a closed-circuit position, in which the relay completes said one of said first and second electrical paths, and an open-circuit condition, in which the relay interrupts said one of said first and second electrical paths.

2. The engine cranking system of claim 1 wherein said relay is included in said second electrical path, wherein said second set of switch terminal is coupled between said second capacitor terminal and said second control terminal, and wherein said first capacitor terminal is electrically coupled with said first control terminal, and wherein said relay completes said

second electrical path when in said closed-circuit position and said relay interrupts said second electrical path when in said open-circuit position.

3. The engine cranking system of claims 1 or 2 wherein said first and second switches comprise a double pole, single-throw switch.

4. The engine cranking system of claim 3 wherein said double pole, single-throw switch comprises an ignition switch.

5. The engine cranking system of claims 1 further comprising a running engine sensory component coupled between one of said system ground and said first battery terminal and one of said first and second control terminals, wherein said running engine sensory component maintains said relay in said closed-circuit position when said engine is operated in said running condition.

6. The engine cranking system of claims 1 or 2 further comprising a running engine sensory component coupled between said system ground and said second control terminal, wherein said running engine sensory component maintains said relay in said closed-circuit position when said engine is operated in said running condition.

7. The engine cranking system of claim 6 wherein said running engine sensory component comprises a normally open oil pressure switch electrically coupled between said system ground and said second control terminal, wherein said normally open oil pressure switch is positionable in a closed position in response to at least a predetermined minimum oil pressure being applied thereto.

8. The engine cranking system of claim 7 wherein said predetermined minimum pressure is greater than or equal to about 5 psi.

9. The engine cranking system of claim 1 wherein said capacitor comprises a double layer capacitor characterized by a capacitance greater

than about 150 farads and an internal resistance at 20°C less than about 0.008 ohms.

10. The engine cranking system of claim 1 further comprising a third switch coupled between the first battery terminal and the first switch, said third switch moveable between at least an off position and a run position.

11. An engine cranking system comprising:

an engine operably moveable between a running condition and an off condition;

a cranking motor coupled to said engine;

a battery comprising positive and negative battery terminals, said positive battery terminal electrically coupled to said cranking motor and said negative battery terminal electrically coupled to a system ground;

a capacitor comprising positive and negative capacitor terminals;

first and second electrical paths interconnecting said positive and negative capacitor terminals, respectively, with said cranking motor and said system ground;

a double-pole, single throw ignition switch comprising first and second sets of switch terminals respectively, wherein said first set of switch terminals is coupled between said positive battery terminal and said cranking motor;

a relay included in said second electrical path and having first and second control terminals, wherein said second set of switch terminals is coupled between said negative capacitor terminal and said second control terminal, and wherein said positive second capacitor terminal is electrically coupled with said first control terminal, and wherein said relay is moveable between at least a closed-circuit position, in which the relay completes said second electrical path, and an open-circuit condition, in which the relay interrupts said second electrical path; and

a running engine sensory component coupled between said system ground and said second control terminal, wherein said running engine

sensory component maintains said relay in said closed-circuit position when said engine is operated in said running condition.

12. The engine cranking system of claim 11 wherein said running engine sensory component comprises a normally open oil pressure switch electrically coupled between said system ground and said second control terminal, wherein said normally open oil pressure switch is positionable in a closed position in response to at least a predetermined minimum oil pressure being applied thereto.

13. The engine cranking system of claim 12 wherein said predetermined minimum oil pressure is greater than or equal to about 5 psi.

14. The engine cranking system of claim 11 wherein said capacitor comprises a double layer capacitor characterized by a capacitance greater than about 150 farads and an internal resistance at 20°C less than about 0.008 ohms.

15. The engine cranking system of claim 11 wherein said ignition switch comprises a first ignition switch and further comprising a second ignition switch coupled between the first battery terminal and the first ignition switch, said third switch moveable between at least an off position and a run position.

16. A method for cranking an internal combustion engine comprising:

providing an engine cranking system comprising an engine operably moveable between a running condition and an off condition, a cranking motor coupled to said engine, a battery comprising first and second battery terminals, said first battery terminal electrically coupled to said cranking motor and said second battery terminal electrically coupled to a system ground, a capacitor comprising first and second capacitor terminals, first and second electrical paths interconnecting said first and second

capacitor terminals, respectively, with said cranking motor and said system ground, first and second switches comprising first and second sets of switch terminals respectively, wherein said first set of switch terminals is coupled between said first battery terminal and said cranking motor, and a relay included in one of said first and second electrical paths and having first and second control terminals, wherein said second set of switch terminals is coupled between one of said first and second capacitor terminals and said second control terminal, and wherein the other of said first and second capacitor terminals is electrically coupled with said first control terminal, and wherein said relay is moveable between at least a closed-circuit position, in which the relay completes said one of said first and second electrical paths, and an open-circuit condition, in which the relay interrupts said one of said first and second electrical paths;

simultaneously closing said first and second switches;

applying a control voltage to said relay with said capacitor through said second switch; and

positioning said relay in said closed-circuit condition in response to said control voltage being applied thereto and thereby completing said one of said first and second electrical paths.

17. The method of claim 16 wherein said relay is included in said second electrical path, wherein said second set of switch terminal is coupled between said second capacitor terminal and said second control terminal, and wherein said first capacitor terminal is electrically coupled with said first control terminal, and wherein said positioning said relay in said closed-circuit position and thereby completing said one of said first and second electrical paths comprises completing said second electrical path when said relay is positioned in said closed-circuit position and further comprising positioning said relay in said open-circuit condition and thereby interrupting said second electrical path with said relay.

18. The method of claims 16 or 17 wherein said first and second switches comprise a double pole, single-throw switch.

19. The method of claim 18 wherein said double pole, single-throw switch comprises an ignition switch.

20. The method of claim 16 further comprising providing a running engine sensory component coupled between one of said system ground and said first battery terminal and one of said first and second control terminals, operably moving said engine to said running condition in response to said simultaneously closing said first and second switches, sensing that said engine is in said running condition with said running engine sensory component, and maintaining said relay in said closed-circuit position with said running engine sensory component.

21. The method of claim 16 or 17 further comprising providing a running engine sensory component coupled between one of said system ground and said second control terminal, operably moving said engine to said running condition in response to said simultaneously closing said first and second switches, sensing that said engine is in said running condition with said running engine sensory component, and maintaining said relay in said closed-circuit position with said running engine sensory component.

22. The method of claim 21 wherein said running engine sensory component comprises a normally open oil pressure switch electrically coupled between said system ground and said second control terminal, and wherein said sensing that said engine is in said running condition comprises applying a predetermined minimum oil pressure to said normally open oil pressure switch and wherein said maintaining said relay in said closed-circuit position comprises positioning said normally open oil pressure switch in a closed position.

23. The method of claim 22 wherein said predetermined minimum oil pressure is greater than or equal to about 5 psi.

24. The method of claim 16 wherein said capacitor comprises a double layer capacitor characterized by a capacitance greater than about 150 farads and an internal resistance at 20°C less than about 0.008 ohms.

25. The method of claim 16 further comprising providing a third switch coupled between the first battery terminal and the first switch, said third switch moveable between at least one of an accessory and off position and a run position.

26. The method of claim 25 further comprising maintaining said third switch in said one of the accessory and off positions while applying said control voltage to said relay with said capacitor and charging said capacitor with said battery.

27. The method of claim 25 further comprising placing said third switch in the run position and thereby cranking said engine while said relay is positioned in said closed-circuit condition.